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From: Wayne Hedberg
To: Minerals
Date: 3/22/96
Subject: USMX/DWQ/DOGM Closure Mtg. - M/053/005

On March 21, 1996 (3:00 - 5:15pm), I met with representatives from USMX of Utah Inc., JBR (USMX's consultant) and DWQ at the Cannon Health Building. The purpose of the meeting was to discuss USMX's draft closure proposal for the remaining heaps and processing facilities at the Goldstrike Mine. We also were introduced to Doug Jensen (a new Goldstrike employee), who will be replacing Robert Wilson at the mine. Mr. Jensen has had experience in closing USMX's Green Springs Project (gold heap leach) in Nevada. He will now oversee the final reclamation and closure activities at the Goldstrike mine.

Robert Wilson presented DWQ and myself with copies of their first rough draft of a closure plan for the heaps and remaining ancillary processing facilities at the mine. He asked for comments/feedback from the regulatory agencies within the next 30-60 days if possible. They want to know if their conceptual closure plan will be considered by the respective agencies or not before they commit any additional time, money and energies into finalizing the proposal.

Mr. Mahmood Azad (JBR) explained the basic concept behind the anoxic bioreactor which USMX is proposing to use as a means of treating the leachate that will continue to drain down from the heaps (proposed 35 yr. design life). Apparently the current leachate will not meet DWQ's established water quality standards for arsenic, selenium, nitrate, and lead. The bioreactor will be used to precipitate out the metals as insoluable hydroxide compounds.

A small pilot-scale bioreactor will be built and tested onsite within the next 30-45 days to test the effectiveness in the field, before they expand their designs for the large scale treatment project. The pilot-scale plant will be totally self-contained using existing facilities with minor modifications. It is anticipated that the pilot scale bioreactor will be tested for at least 90 days before they will have sufficient data to confirm its effectiveness. Both DWQ and DOGM personnel agreed that no additional permitting would be necessary from either agency for the pilot-scale testing.

Also discussed at the meeting was the issue of whether Heap #1 (which is almost completely reclaimed) should be ripped to the 12" depth as presently permitted by DOGM. DWQ has expressed concerns that deep ripping could cause problems with increased rates of leachate production from the heap that would require supplemental treatment to meet water quality standards (i.e., possibly affecting bioreactor sizing and effectiveness). Following discussions concerning the nature of the leached ore, depth of applied topsoil (@12" average depth) and basic erosional/stability consideration it was agreed that contour ripping to 12" or less, then drill seeding, would probably not cause significant long term problems which could not be adequately handled by the proposed treatment system.

Attendees at the meeting included the following:

USMX - Robert Wilson and Doug Jensen
JBR - Robert Bayer, Mahmood Azad
DWQ - Fred Pehrson, Kiran Bhayani, Mack Croft, Dennis Frederick, Lyle Stott
DOGM - Wayne Hedberg

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CC: LBraxton, DFrederi

30-60 days for comment on this closure plan.

* received DOGM 3/21/96

* Test pilot project want to go ahead with unless told otherwise.

USMX GOLDSTRIKE MINE
PERMANENT CLOSURE PLAN
JANUARY 1996

1.0 INTRODUCTION:

This closure plan deals primarily with the procedures for closure of the Goldstrike Mine mineral processing facilities. It has been written to comply with the requirements to protect waters of the state under statute and administered by the Utah Division of Water Quality. Two related activities, mining of ore, and the processing of ore to recover precious metals, occurred at Goldstrike. Reclamation and closure of mine pits and associated haul roads, etc. is currently being completed as outlined in approved permits. This plan is intended to comply with all current permit requirements in force under State and Federal Agency's. The ultimate goal of this plan is to meet or exceed all closure requirements.

The Goldstrike mine is located 35 miles northwest of St. George in Washington county, Utah. The mine is operated under, a Notice of Intent approved by the Utah Division of Oil, Gas and Mining, a Plan of Operations approved by the Bureau of Land Management, Construction and Groundwater Discharge permits approved by the Utah Division of Water Quality and various other State and County permits.

Initial construction and mine development work by Tenneco Minerals began in August of 1988 and has gone through several stages of growth and permitting. USMX, Inc. bought the operation in November of 1992 and is the parent company of the current operator, USMX of Utah, Inc. Mining of ore at Goldstrike ended in October of 1994. Since this time operations at the mine have consisted of metals recovery from the leach pads and reclamation of the mine pits and roads. Metals recovery from the leach pads is essentially complete at this time and decommissioning and closure are in progress.

1.1 FACILITIES DESCRIPTION

The process facilities at Goldstrike consist of the following:

Carbon Recovery Plant.
This plant consists of a building in which is housed several small individual process components. There are 5 open top carbon tanks, in series. Each tank contains activated carbon to adsorp precious metals from the leach solution. An electrowinning circuit is used

to remove the metals from the carbon and produces a sludge which is smelted in a crucible furnace to produce metal bars. An acid wash system is used to remove undesirable metals which become bonded with the carbon. A carbon regenerating kiln is used to cleanse the carbon of unwanted organic compounds or oils which may impair metals recovery. A cyanide mixing vessel from which cyanide was added to the process, is outside the building. Also in this area there is a blast furnace and two diesel power generators.

Ponds

There are six High Density Polyethylene (HDPE) lined ponds constructed at the site all of which are lined with compacted low permeability clay layer below the HDPE liner. Four ponds, the Pregnant Solution (preg), Barren Solution (barren), Recycle and Rinse Water are double lined with HDPE with a leak detection/collection sump between the layers. The remaining two ponds, the Hamburg pond and Fresh Water Pond, have a single HDPE liner with a leak detection /collection sump below the HDPE liner.

Two earthen ponds which are constructed in the backfilled East Hamburg pit are not a part of the process facilities, however these ponds may be used as the disposal area for water which will be released from the proposed Biopass System. The two earthen ponds have a combined capacity of 7,300,000 gallons.

NO EXACT LOCATION WHY?

Leach Pads

There are two leach pads at Goldstrike. Each pad was constructed with 12 inches of low permeability clay base. Above this is 6 inches of gravel which is divided into leak detection cells that drain into a collection ditch. Above the gravel is an additional layer of low permeability clay which is covered by the HDPE liner. A two foot minimum depth of crushed drain rock base was placed on the pad prior to ore loading. The leach pads were constructed in a sloped manner so that the solution travels through the drain rock to the lower margins of the pads. Lined collection ditches were constructed along the low side of the pads through which solutions are directed to drop collection sumps. Water from the sumps flow through a pipeline to the pregnant solution pond.

Leach pad 1 has a surface area of 14.7 acres and has been loaded to a depth of approximately 100 feet. Pad 2 covers 35.8 acres and has an ore loading depth of approximately 200 feet. Leach pad 1 and pad 2 have a contained volume of 1,921,500 and 5,989,822 tons of ore respectively.

Piping system

Solution is pumped from the barren pond through a double containment pipeline to the leach pads. After application, the solution percolates down through the ore and is collected in a sump. From this point the water flows by gravity to the preg pond. The water is then pumped through the carbon columns and returns to the barren pond. In addition to this

primary circuit there are piping systems which will have the capacity to deliver water to other ponds as needed, and to bring fresh water into the mine site.

2.0 CLOSURE PLAN

This closure plan addresses the following:

Rinsing and neutralization of leach pads.
Water disposal.
Design and construction of biochemical passive (biopass) treatment for long term pad drainage.
Regrading and reclamation of the leach pad surfaces.
Removal of the physical facilities.
Long term monitoring and final release.

2.1 Rinsing and neutralization of the leach pads.

Rinsing of the leach pads began with the cessation of cyanide addition. A summary of rinsing activities conducted to date is as follows:

2.11 LEACH PAD 1

DI seep cyanide was added as late as 11/94

A fresh water rinse of Pad 1 was initiated in early 1993. The fresh water rinse of pad 1 was interrupted in the spring of 1995. This was due to heavy precipitation which resulted in a need to use the pad as a contained area on which to apply excess solutions. The solution applied was dilute due to rainfall and the natural depletion of cyanide. USMX had stopped cyanide addition to the process circuit in November of 1994 as a precautionary measure because of high spring precipitations experienced in prior years.

ARE THESE TWO DATES IN CONFLICT?

Natural cyanide neutralization has been quite rapid to this point. Calcium hypochlorite was used for a short period on Pad 1 and appeared to retard the natural degradation. It is hypothesized that this was due to Chlorine impairment of naturally occurring cyanide reducing bacteria. A 20 - 40 ppm Ferric Sulfate solution was applied in an attempt to complex free arsenic. On site testing for Arsenic has shown this treatment to be ineffective.

Pad 1 has had a total of 93.3 million gallons of rinse water applied to the pad. Of this total 18.7 million gallons was fresh water. This equates to 48 gallons of rinse water per ton of ore on the pad. Water samples taken from Pad 1 to monitor constituent levels are listed in table 2.11-1.

At present on pad 1, the groundwater standards are exceeded by the following constituents: Nitrate by a factor of 10, Arsenic by a factor of four, Free cyanide, Mercury and Selenium by an average factor of 1.5.

USMX believes that this leach pad is rinsed to the full extent which is practical and is proposing the installation of a biological passive treatment system (Biopass System). This system will further reduce the level of contaminants in the pad off-flow solutions. The Biopass System is discussed in section 2.3 of this document.

2.12 LEACH PAD 2

USMX began rinsing Leach Pad 2 in November of 1994. Rinsing was initiated on the upper portions of the pad and is proceeding forward toward the low end of the pad. Three specific areas are used for tracking of the amount of rinse solution applied to Pad 2. These are, the original permitted leach pad 2 (Orig. Pad 2), The first extension of Leach Pad 2 (Pad 2 Ext.) and the second extension of Leach Pad 2 (Pad 2-E2).

As of Dec 1 1995 the following amounts of rinse solution has been applied to these areas of Pad 2. 116,600,000 Gallons of rinse water was applied to Orig. Pad 2 had for a total of 46.6 gal/ton of loaded ore. 33,300,000 gallons of water was applied to Pad 2 Ext. for a total of 11.3 gal/ton of loaded ore. Pad 2-E2 is under rinse at this time.

Testing of the solutions, from the Preg Pond which represents the outflow from Pad 2, was initiated in November of 1994. Initial results in table 2.11-1 show that the levels are very similar those found in Pad 1 solution. Rinsing of leach pad 2 has been very effective in reducing the contaminant levels of the solution partially due to the fact that USMX began operating at reduced cyanide levels on Pad 2 as early as September 1994.

A decision was made in October of 94 that, a reduced concentration of cyanide would accelerate the achievement of decommissioning goals and still allow for the recovery of the remaining precious metals. The concentration of cyanide fell off rapidly due to natural degradation and also to dilution from rainfall received in the spring of 1995. Anticipated precious metals recovery had not been achieved, and a decision was made to add cyanide for a short duration during the summer of 1995 to evaluate additional recovery potential. This addition proved ineffective in increasing metals recovery and therefore was discontinued.

HOW LONG WAS THE "SHORT DURATION"?

TO ALL PORTIONS OF THE PAD

A summary of the free cyanide concentrations found in the Preg pond and total pounds of cyanide added to the circuit since November of 1994 is found in table 2.12-1. These cyanide concentrations are HACH test results from the USMX lab. It is felt by USMX that when

cyanide was stopped 6/95?

Pad 2 is sufficiently rinsed and drained, the remaining seepage can also be directed to the Biopass System.

2.2 WATER DISPOSAL

USMX estimates that there will be a total of ---------- gallons of water in the vadose zone of Leach Pad 2. It is expected that the majority of this solution will drain from the pad for a short duration following the end of surface application. This solution will be disposed of by either of two methods. These being application to the reclaimed area of leach pads and/or the surface application in reclaimed areas of the mine site. This surface application will enhance establishment of vegetative growth. The constituent levels in the drain down solution will dictate the appropriate method of disposal.

(see attached attenuation analysis prepared by JBR)

2.3 Design and construction of biochemical passive (Biopass) treatment for long term pad drainage.

USMX is proposing to utilize an existing lined pond as a site to construct the Biopass System.

WHICH ONE?

(JBR provide the design information for the biopass system)

Following treatment of the water through the Biopass system it will be carried to an adjacent area for evaporation and/or infiltration. Water quality at this point will be of such that there will be no measurable long term impact to waters of the state.

WHAT AREA?

HOW WILL THIS WATER BE MONITORED AND REPORTED

2.4 Regrading and reclamation of the leach pad surfaces.

In November of 1995 USMX submitted to DWQ a plan for decommissioning and regrading of Leach Pad 1. The plan was approved in December of 1995 as permitted by rule. The leach pads were originally constructed and loaded with ore on a slope of 2:1, horizontal/vertical. The approved plan involved the placement of a Geosynthetic Clay Liner (GCL) around certain portions of the Leach Pad 1 expanding the ore containment area. The approved plan for leach pad 1 is contained in appendix -- of this report.

The final plan for Leach Pad 2 will be essentially the same concept as that approved for Pad 1. Overall site maps showing the current and proposed configurations of leach pad 2 is shown on the enclosed drawing number 2.

Leach Pad 2 has a haulage road which completely traverses the circumference of the pad. Part of this road will need to be left in place to complete the continuity of roads which

existed previous to mining. Additionally the haul road along the south side of Pad 2 serves as a spillway for the Quail Creek Drainage Dam. The dam was created to facilitate the use of a portion of the draw below it for an extension of Pad 2. During the most extreme weather which we have experienced at the site, the water level in the pond has never been higher than the half-way point of the dam. Still it is advisable to maintain the road as a spillway in the event the pond should overflow.

The extension of the leach pad containment area will be such that, upon completion of reshaping of the pads, all precipitation which enters the surface of the pad and percolates downward through the rinsed ore will flow to the collection system. All drainage from the pad will be collected in perforated pipes, to be installed in the existing collection ditches. During the final regrading of the pad these pipes and ditches will be covered with pad material. Water will flow through the perforated pipes and existing facilities to the Biopass System. The existing sumps of the leach pad will be filled with drain rock creating a french drain system to collect pad effluent. Following the completion of the french drain system, rinsed ore will be placed over the sumps on a slope not to exceed 2-1/2:1 and the slope will be topsoiled and seeded to establish vegetation.

COLLECTION SYSTEM INTACT UNTIL ∞

A deviation from the previously approved regrading plan will be that, on final closure, the finished topsoiled surface of both leach pads will shed surface waters from storms into established drainages outside the reclaimed leach pads. The resulting effect will be that inflow, to the core of the leach pad, will be minimized. Evaporation and transportation from the vegetated surface will also reduce precipitation inflow into the pads. Because the surface of the pads will be covered with a layer of topsoil this surface flow will not contact any of the rinsed ore. At completion of the regrading and topsoiling of the ore, all exposed liner material on the outside slope of the containment berms will be either removed or covered with soil. All piping which carries water from the collection sumps to the Biopass System will be fusion welded HDPE and will be buried where possible.

HOW IS THIS GOING TO BE CONFIRMED PERHAPS A PIEZOMETER WOULD BE APPROPRIATE NO CAPILLARY BARRIER

2.5 Removal of the physical facilities.

The buildings, process equipment, and ancillary facilities are relatively portable. They will be disassembled and removed from the project site as soon as they are no longer required. All surface piping will be removed. Underground pipes and cables will be disconnected below the ground surface and the portion which is underground will be left in place.

IS THIS ACCEPTABLE TODAY?

The range fence which is around the perimeter of the mine will be left in place as per an agreement reached with the BLM and range permit holders. The chain link fence which is around the process facilities will be removed and the posts pulled out of the ground. The HDPE liners which are in the ponds will either be salvaged and taken from the mine site or

IF MINIMUM DEPTH 2 FT?

folded over in place in the pond bottoms and buried. After the removal of the buildings the concrete foundations will be pushed into the bottom of the ponds and buried.

2.6 Long term monitoring and final release.

At completion of the initial bioreactor incubation period, samples of the water flowing into and out of the Biopass System will be sampled. Samples will be sent to a laboratory and tested for levels of contaminants. Samples will be tested monthly from these points until three consecutive samples meet the MCL' s for groundwater or agreed upon results. At this time the sampling period will be changed to a quarterly interval. Quarterly sampling will continue, until a series of four consecutive quarterly samples achieve acceptable results. At this time the system will be accepted as fully functional and USMX will be released from further obligation. Should the results of a quarterly sample not fall within the guidelines agreed upon, the division will be notified in a timely manner and new samples collected and tested. If the re-test sample is acceptable the original sample for that quarter will be rejected in favor of the re-test.

Following final grading of the leach pads, testing of the monitor wells on site will be discontinued for all but M 7. This well will be sampled quarterly for the first year and semi-annually during the remaining period of time for which testing is required for the Biopass System as outlined above. Wells which have sampling discontinued will be capped but left functional should follow-up sampling be required for any reason.

LEACH PAD DRAINDOWN SOLUTION TESTING

PAD 1

DATE	CN FREE	FLUORIDE	NITRATE	NITRITE	ARSENIC	BARIUM	CADMIUM	CHROMIUM	COPPER	LEAD	MERCURY	SELENIUM	SILVER	ZINC
02/17/94			71.7	NA	0.243		<.005	<.05	<.01	<.05	0.0121	0.042	0.012	0.04
05/19/94	0.12		103	0.026	0.288		<.005	N A	0.02	NA	0.0007	0.064	NA	0.01
06/21/94	0.03				0.275					<.05	0.0014	0.097		<.005
07/27/94	0.11		94.4		0.267		<.005		<.01	<.05	<.0005	0.074		0.09
08/13/94	0.16		110		0.224		0.013	<.05	<.01	0.07	0.0009	0.046	0.016	0.14
08/24/94	0.14		86.8		0.28	ND	<.005		<.01	<.05	0.0011	0.005		0.11
10/06/94	0.261	0.44	118		0.248	0.044	<.005	<.01	<.01	<.015	0.0019	0.101	<.01	0.06
10/20/94	0.29	0.33	121	0.086	0.244	0.043	<.01	<.01	<.01	<.02	0.0007	0.079	<.01	0.03
01/17/95	0.276	<.3	70.8	0.029	0.212	0.032	<.01	<.01	<.01	<.01	0.0004	0.05	<.01	0.04
02/27/95	0.182	0.34	106	0.374	0.205	0.037	<.01	<.01	<.01	<.01	0.0011	0.087	<.01	0.08
03/28/95	0.69	0.35	104	0.047	0.225	0.039	<.005	0.066	<.01	<.005	0.0007	0.119	0.0098	0.09
08/30/95	0.44	0.37	107	0.094	0.215	0.04	<.005	<.01	<.01	0.015	0.00024	0.099	<.005	0.07
10/17/95	0.33	<.06	130	0.053	0.255	0.04	<.005	0.007	0.02	0.011	0.001	0.07	<.005	0.41
11/14/95	0.23	<.5	127	0.142	<.02	0.04	<.005	0.006	0.02	0.01	0.0004	0.1	<.005	0.14
12/11/95	0.09	0.6	154	0.129	0.1	<.01	<.03	<.03	<.05	<.05	<.0002	0.2	<.03	0.2
AVERAGE	0.23	0.23	103.82	0.09	0.227	0.035	0.00	0.01	0.005	0.008	0.002	0.07	0.00	0.09

WATER QUALITY STANDARD

	0.2	4	10	1	0.05	2	0.005	0.1	1.3	0.015	0.002	0.05	0.1	5

PAD 2

DATE	CN FREE	FLUORIDE	NITRATE	NITRITE	ARSENIC	BARIUM	CADMIUM	CHROMIUM	COPPER	LEAD	MERCURY	SELENIUM	SILVER	ZINC
11/14/95	0.13	0.5	219	2.82	0.2	<.01	<.03	<.03	<.05	0.05	0.0006	<.02	<.03	0.1
12/11/95	0.26	0.4	235	12.1	0.15	0.04	<.01	0.03	0.02	<.02	0.0071	0.1	<.01	0.06

TABLE 2.11-1

USMX GOLDSTRIKE MINE

Pad #2 Free Cyanide

Date	CN	pH	Comments	
08/29/94	15	10.2		
09/09/94	10	10.3		
10/10/94	7	10.3		
10/24/94	12	10.3		
11/07/94	13	10.3	Shut off cyanide 11/11/94	
11/25/94	2.8	10		
12/05/94	2	10.1		
12/19/94	1.6	10.1		
01/05/95	0.9	10		
01/21/95	0.4	10		
02/11/95	0.15	10		
03/07/95	0.2	9.6		
04/21/95	0.1	9.3		
05/16/95	0.2	9.4		
06/22/95	10	9.4	Add cn 6/15/95	36000 lbs in June
07/11/95	25	10		18000lbs in July
08/22/95	12	10		24000lbs in August
09/29/95	0.2	8.5	Cyanide Off	
10/09/95	0.2	8.5		
11/14/95	0.03	7.8		
12/12/95	0.09	8.5		
01/07/96	0.03	8.3		

TABLE 2.12-1